

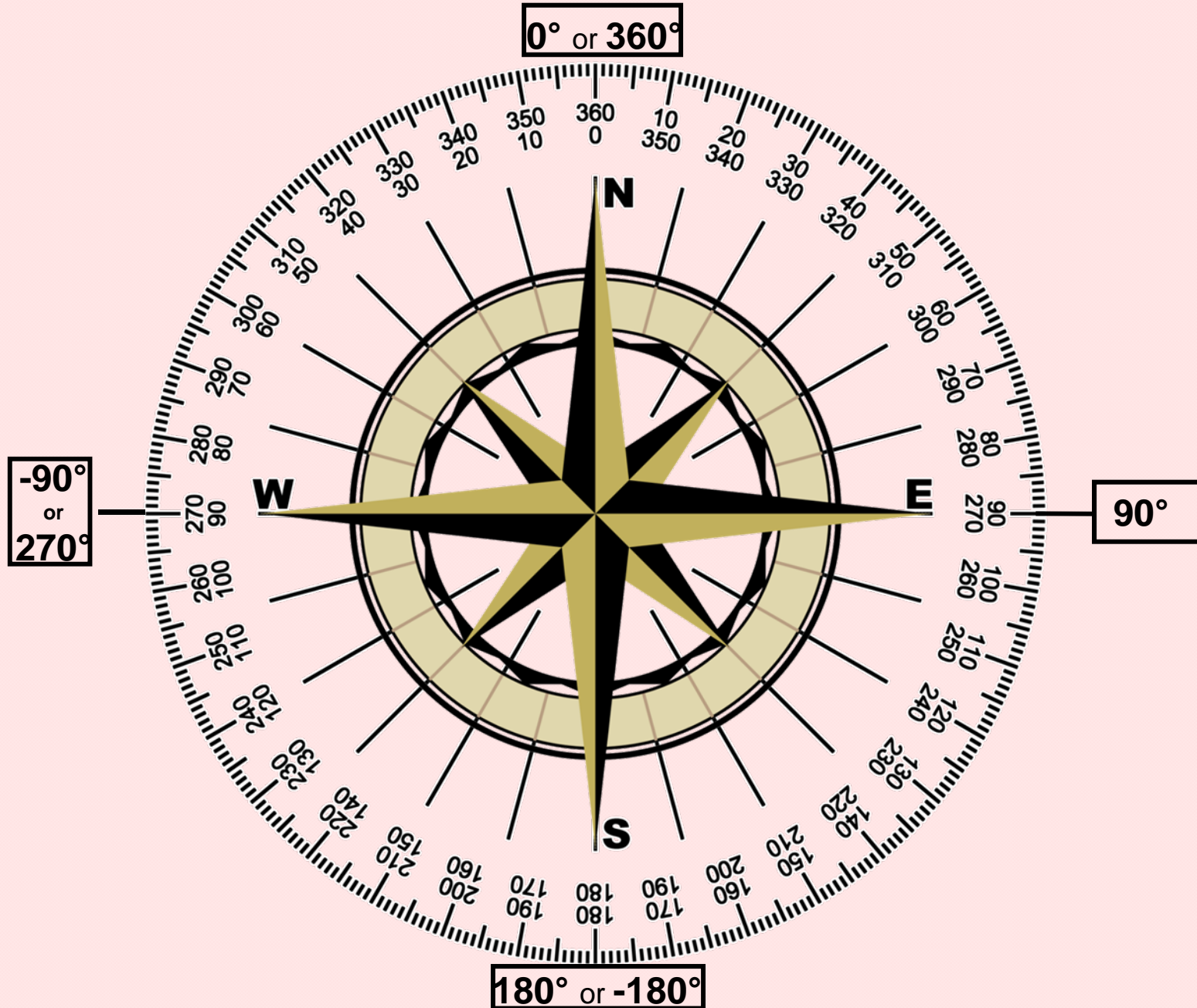
Scratch Primary Lesson 6

Polygons and Flowers

Direction

- Direction is used to indicate the way we are pointing, facing, or moving towards.
- Direction is based on the circle which has 360 degrees.
- The compass is a circle with 360 divisions.
 - North is 0 or 360 degrees
 - East is 90 degrees
 - South is 180 degrees
 - West is 270 or -180 degrees

The Circle



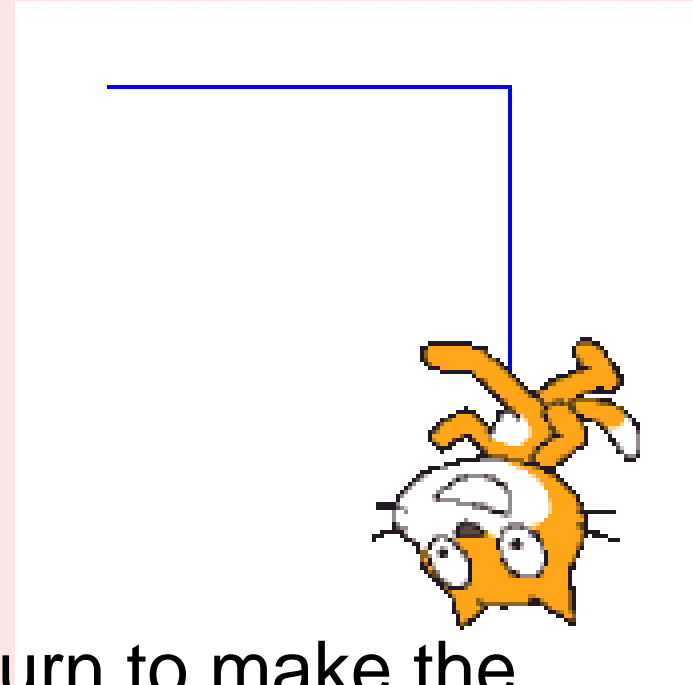
The Circle

- If you start out at any point on the circle and travel 360 degrees, you will end up in the same place and facing the same way as when you started. Try this:



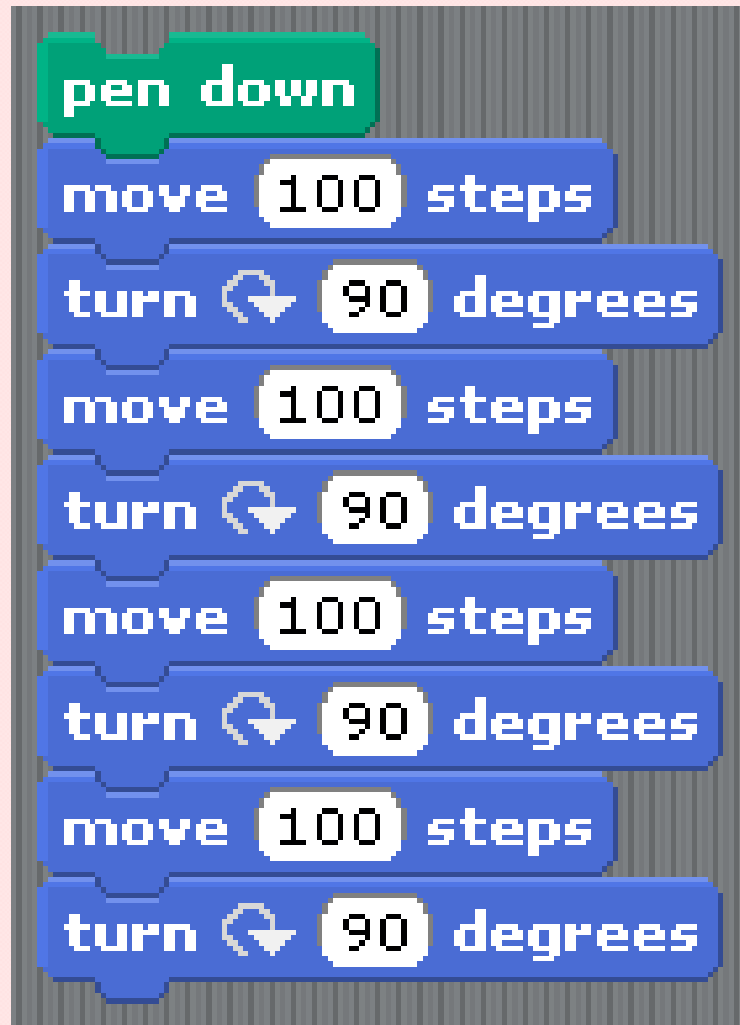
Drawing With Scripts

- Instead of drawing with the arrow keys, lets make a program the computer to draw for us.
- To draw a square draw a line and then turn:



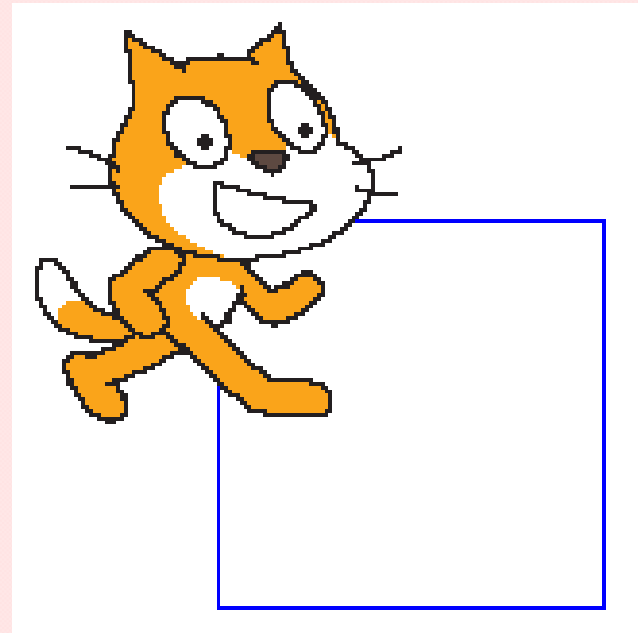
- How many degrees should we turn to make the first corner of the square?
- To make a complete square, how many times do we need to do this?

What does this script do?



- Can you spot the pattern in the script?
 - Hint: What is repeating?
- How can we make this script shorter and still do the same thing?

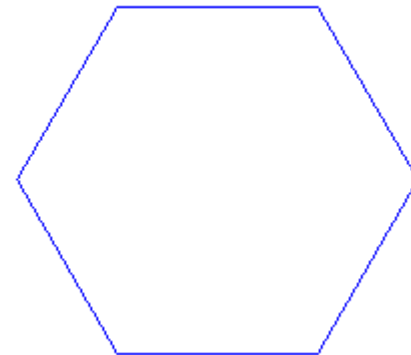
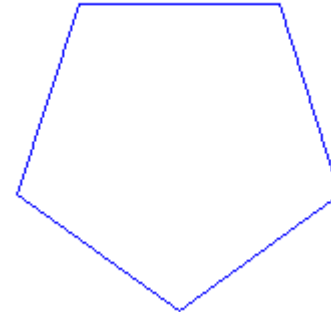
```
pen down
move 100 steps
turn ↻ 90 degrees
move 100 steps
turn ↻ 90 degrees
move 100 steps
turn ↻ 90 degrees
move 100 steps
turn ↻ 90 degrees
```



Polygons

A polygon is a shape with many sides:

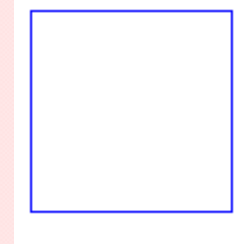
- A square has 4 sides:
- A pentagon has 5 sides:
- A hexagon has 6 sides:



Polygons

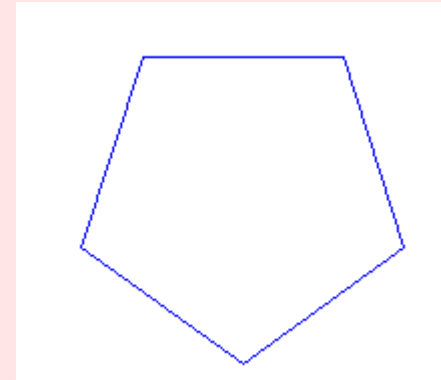
- A square has 4 sides.
 - How many degrees does its corners have?

$$360 / 4 = ??$$



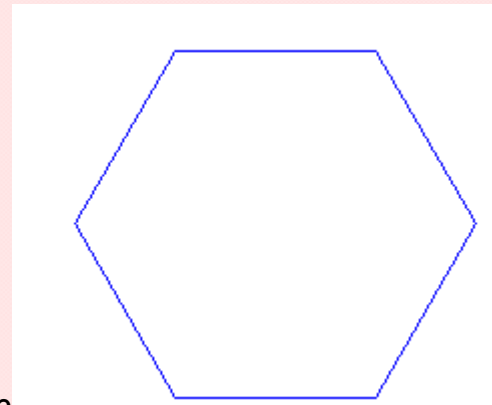
- A pentagon has 5 sides:
 - How many degrees does its corners have?

$$360 / 5 = ??$$



- A hexagon has 6 sides:
 - How many degrees does its corners have?

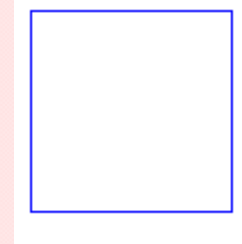
$$360 / 6 = ??$$



Polygons

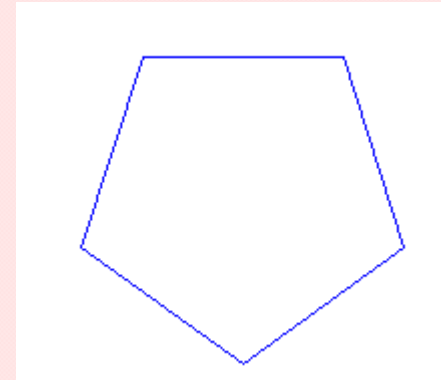
- A square has 4 sides.
 - How many degrees does its corners have?

$$360 / 4 = 90 \text{ degrees}$$



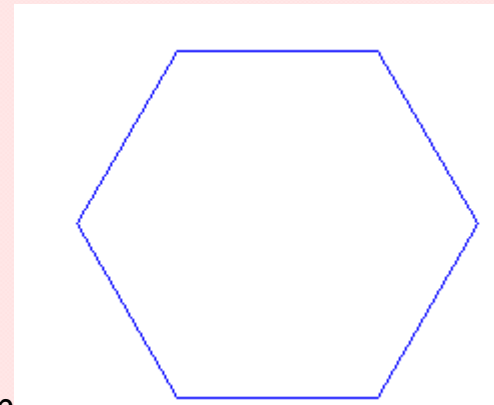
- A pentagon has 5 sides:
 - How many degrees does its corners have?

$$360 / 5 = ??$$



- A hexagon has 6 sides:
 - How many degrees does its corners have?

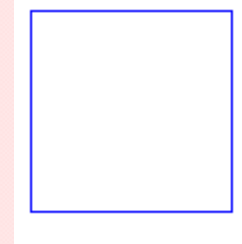
$$360 / 6 = ??$$



Polygons

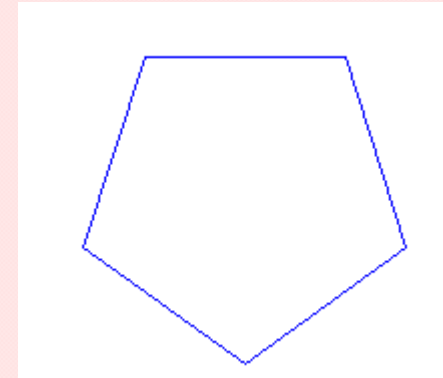
- A square has 4 sides.
 - How many degrees does its corners have?

$$360 / 4 = 90 \text{ degrees}$$



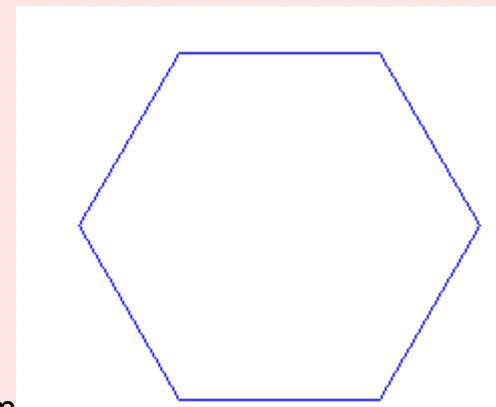
- A pentagon has 5 sides:
 - How many degrees does its corners have?

$$360 / 5 = 72 \text{ degrees}$$



- A hexagon has 6 sides:
 - How many degrees does its corners have?

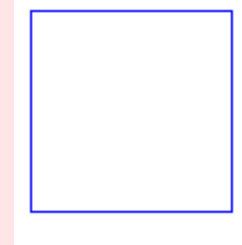
$$360 / 6 = ??$$



Polygons

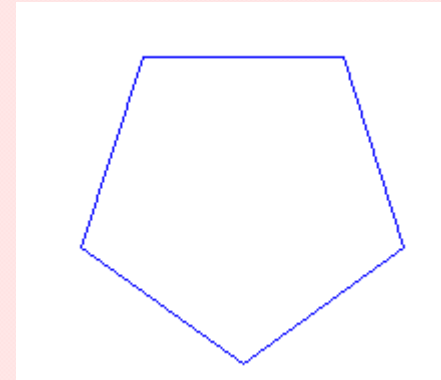
- A square has 4 sides.
 - How many degrees does its corners have?

$$360 / 4 = 90 \text{ degrees}$$



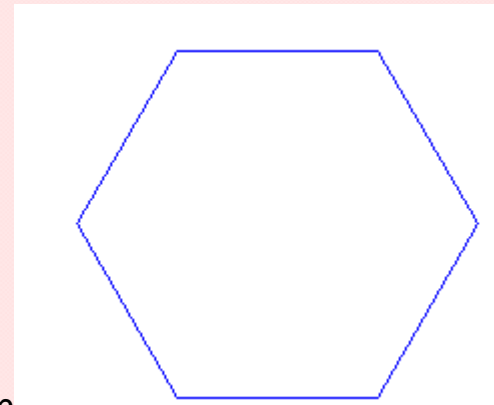
- A pentagon has 5 sides:
 - How many degrees does its corners have?

$$360 / 5 = 72 \text{ degrees}$$



- A hexagon has 6 sides:
 - How many degrees does its corners have?

$$360 / 6 = 60 \text{ degrees}$$

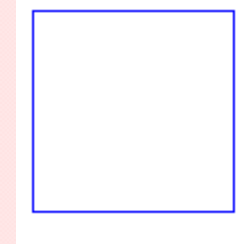


Polygons

- Here are the scripts which draw the polygons:

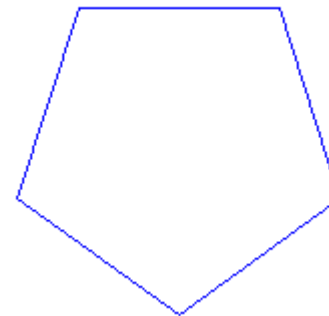
```
pen down
repeat 4
  move 100 steps
  turn 90 degrees
```

$$4 \times 90 = 360$$



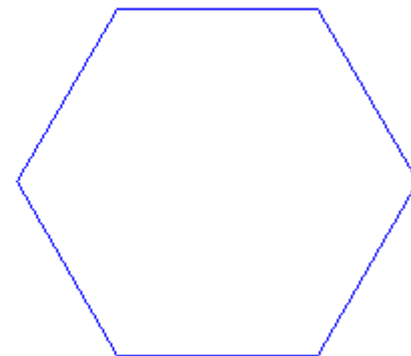
```
pen down
repeat 5
  move 100 steps
  turn 72 degrees
```

$$5 \times 72 = 360$$



```
pen down
repeat 6
  move 100 steps
  turn 60 degrees
```

$$6 \times 60 = 360$$

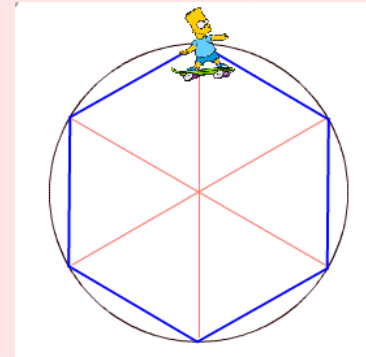


Draw Polygons

- Play with this project and see what kinds of polygons you can draw:

<http://scratch.mit.edu/projects/12990763/>

- What happens if you choose a large number of sides?
What shape do you get?



Make a Flower

- Start out with a square:



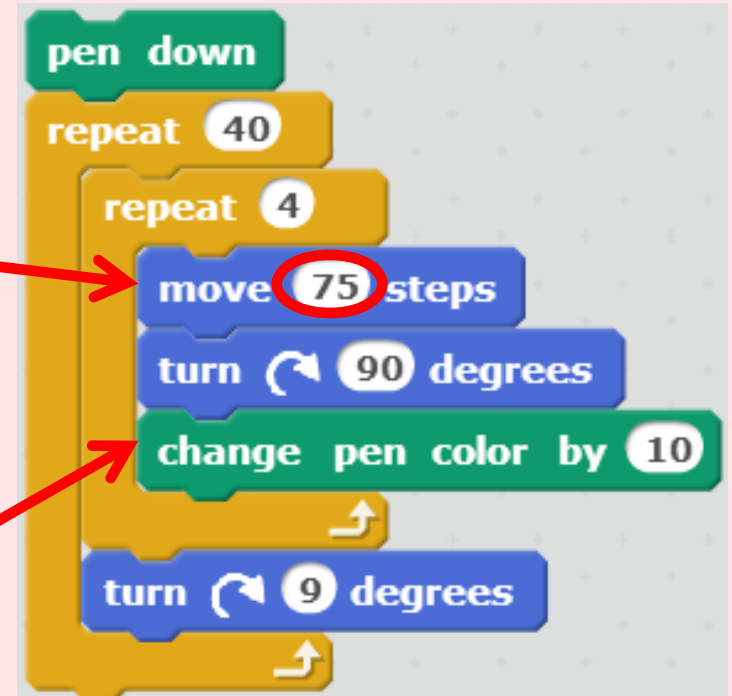
- Put the square inside another repeat block. Remember that repeat x degrees must equal 360:



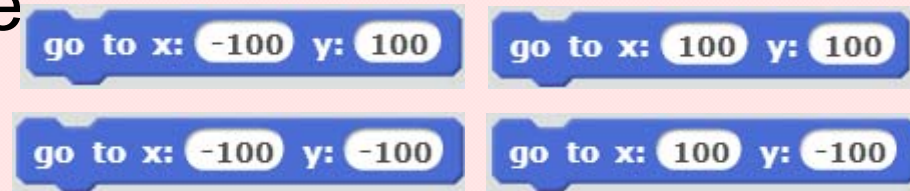
$$40 \times 9 \text{ degrees} = 360 \text{ degrees}$$

Make a Flower

- Try making squares of different sizes:
- Change the pen color each time in the loop to create a rainbow effect:



- Make flowers all over the stage. Start the loops from these locations:



- Look at this project for ideas:

<http://scratch.mit.edu/studios/254501/>

